APPEARANCE OF CATARACT IN RATS ON A VITAMIN B_2 LOW DIET

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For the past three years work has been in progress on a heat stable factor of the vitamin B complex. Feeding experiments have been carried on with albino rats and several points have become evident from the results.

Animals were placed on a diet complete in all factors needed by the rat except for vitamin B_2(G). The foodstuffs, carbohydrate, fat and protein were supplied as pure substances. Minerals were added according to the method of Osborne and Mendel and the vitamins A, D and B_1 were included in the diet as concentrates. For negative controls this diet only was fed to at least one animal in every litter on test. The food on test was added daily in graded amounts usually three different doses. The amounts fed were not adequate for normal nutrition. Only enough was fed to show a gain of 25 grams in eight weeks. Diet and method were developed by Sherman and Spohn 1923[1] and Bourquin 1929[2].

Animals were placed on the vitamin B_2(G) deficient diet when four weeks old and allowed to deplete their store of vitamin which occurred within 25 to 30 days. The food substance on test was then weighed daily for each rat separately and fed in addition to the vitamin B_2 free diet. The experiment continued for eight weeks. Animals were then killed and autopsied. Gross macroscopic lesions were then noted. Cataract of the eye was looked for at the end of the experimental period. Day 1934[3], from the School of Medicine, University of Arkansas, found that the incidence of cataract in vitamin B_2(G) low animals was high and that it was one of the first pathological signs observed, excepting alopecia, or loss of hair. Because the lens is a transparent tissue in which very early changes can be seen with the ophthalmoscope without injury to the animal the progress of the disease can be followed closely.

Results from the animals fed on heart, liver and meat showed the following:

1 Sherman, H. C., and Spohn, A.; J. A. Chem. Soc. 45, 2719. (1923)
2 Bourquin, A.; Dissertation, Columbia Univ. (1929).
3 Day, Paul L., Am. Jour. Public Health, 24, No. 6, 603. (1934).

FOOD FED, AMOUNTS, PERCENTAGE CATARACT FOUND AND MEAN GAIN MADE IN EIGHT WEEKS

Food Fed	Amount Fed	Cataract Found In	Gains Made
Heart	100 mg.	71%	33 gms.
	300 mg.	70%	66 gms.
	500 mg.	60%	90 gms.
Liver	50 mg.	None	-18 gms.
	100 mg.	None	3 gms.
	150 mg.	None	26 gms.
Meat	500 mg.	50%	10 gms.
	750 mg.	None	47 gms.
	1000 mg.	None	57 gms.
	1500 mg.	None	75 gms.

In the case of heart fed there was a decrease in the incidence of cataract as the supplement was increased. Also with increasing growth there was shown a slight decrease in number of cataracts found. On the low dose of meat fed, 500 mg. per day, there was a mean gain of 10 grams for the eight weeks and 50 per cent of the animals had cataracts. When the amount fed was increased there was increase of weight made and no cataracts found. These two results confirm Day's[3] work on the incidence of nutritional cataracts.

The feeding of liver shows a different result. There were no cases of cataract found on all doses fed while the mean grams gain was slight. There is a suggestion that there are two heat stable factors that are measured in the experiment—one the cataract preventive and the other a growth promoting factor. The animals on heart, although the gain in weight was high, looked less well kept than those on the liver. On the liver there was little gain but there were no cataracts.

In a recent article Day[4] found that the flavian fraction is a specific cataract-preventive substance for the rat.

[4] Day, Paul D., J. N. 13, 389. (1937).
[3] loc. cit.